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B6C

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(54) Printing machines with multiple liquid supplying trains

(57) A printing machine is provided with a plurality of liquid supplying trains, such adapted for a particular kind of liquid, and the arrangement of the rollers being adaptable to change the machine as required.

As shown in Fig. 1:–

(a) conventional inking is via rollers 3,4,5,6,12,13;

(b) conventional dampening is via rollers 2,8,9,10,11 with roller 7 interlinking rollers 2 and 3.

(c) supplying mobile water-miscible liquid (e.g. U.V. paint) via at least rollers 2,8,9,10,11. If desired roller 1 can also mediate between roller 10 and the cylinder A.

(d) supplying viscous water-miscible liquid (e.g. acrylic paint) via rollers 1 and 15.

Sequences for the interengagement of rollers during start-up, dwell, etc., are given. A circulation system for U.V. paints is described, whereby the paint may be heated.

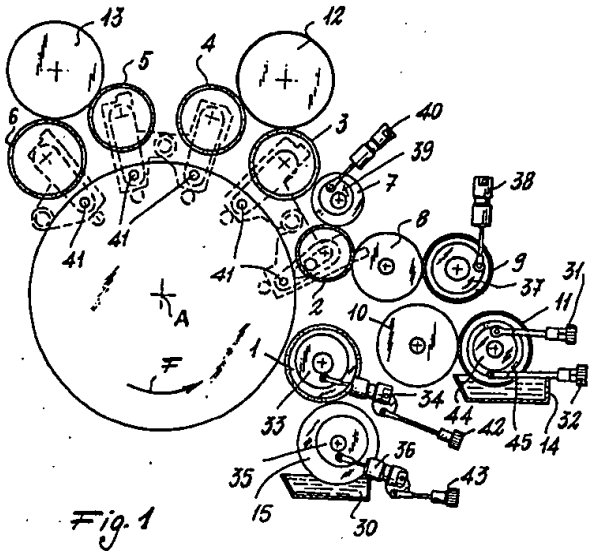

Fig. 1

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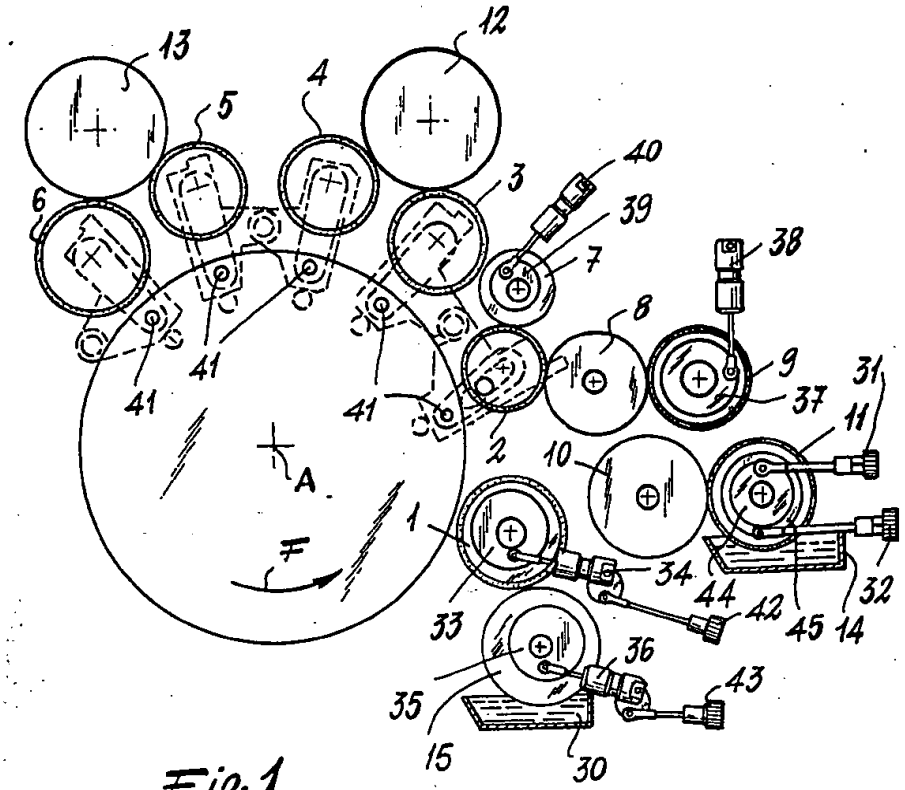

Fig. 1

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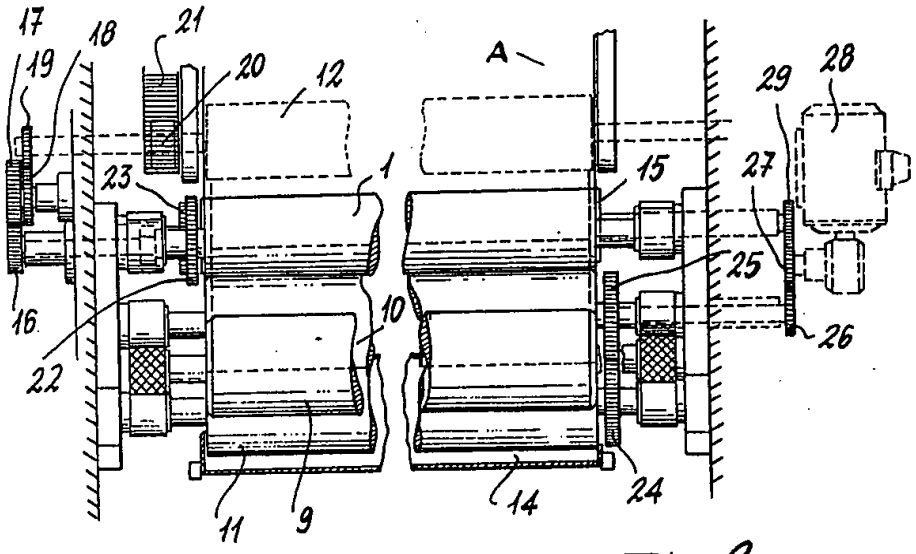

Fig. 2

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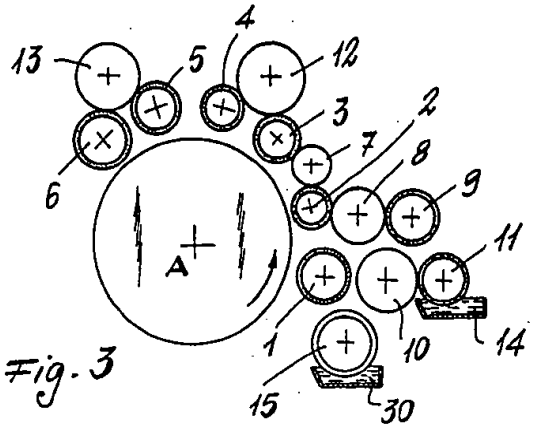

Fig. 3

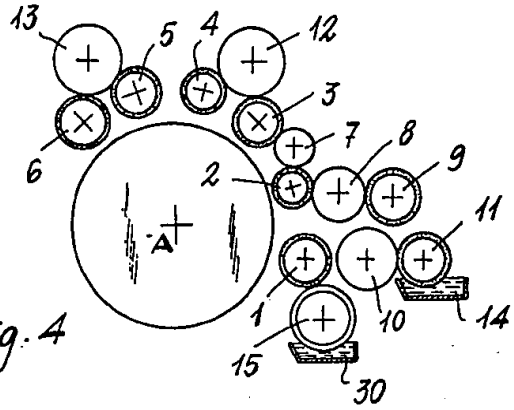

Fig. 4

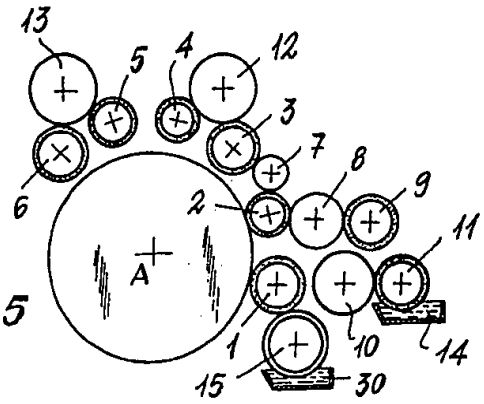

Fig. 5

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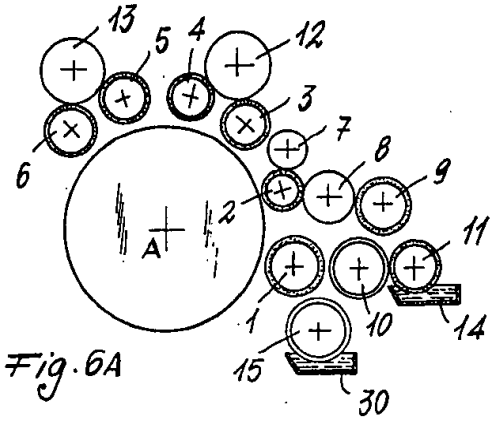

Fig. 6A

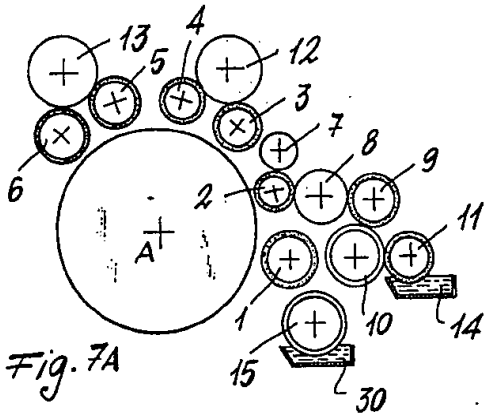

Fig. 7A

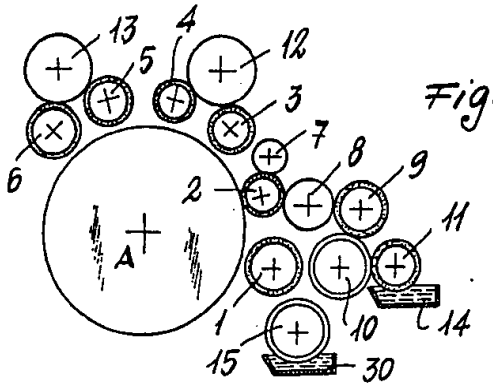

Fig. 8A

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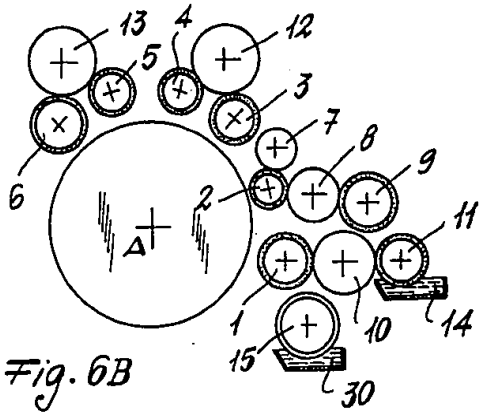

Fig. 6B

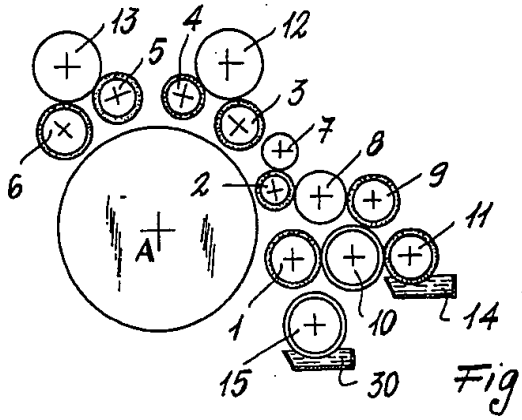

Fig. 7B

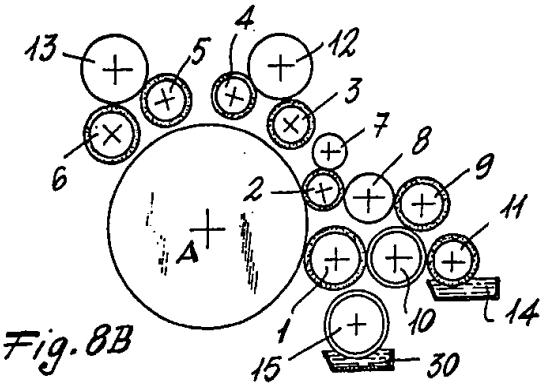

Fig. 8B

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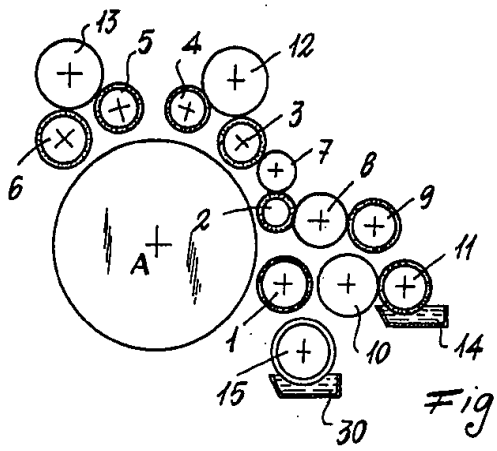

Fig. 9

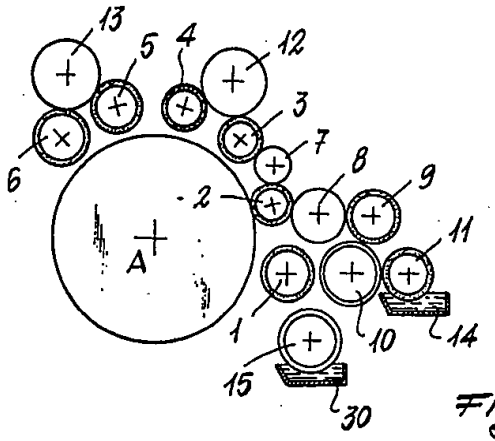

Fig. 10

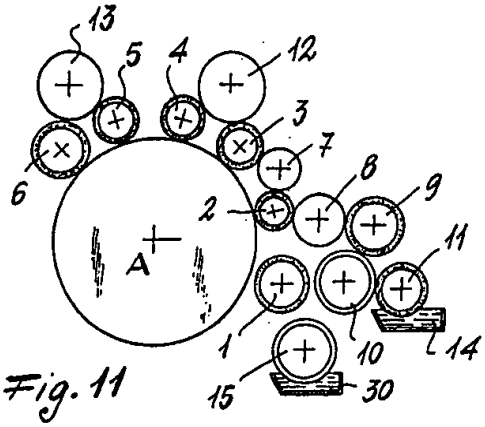

Fig. 11

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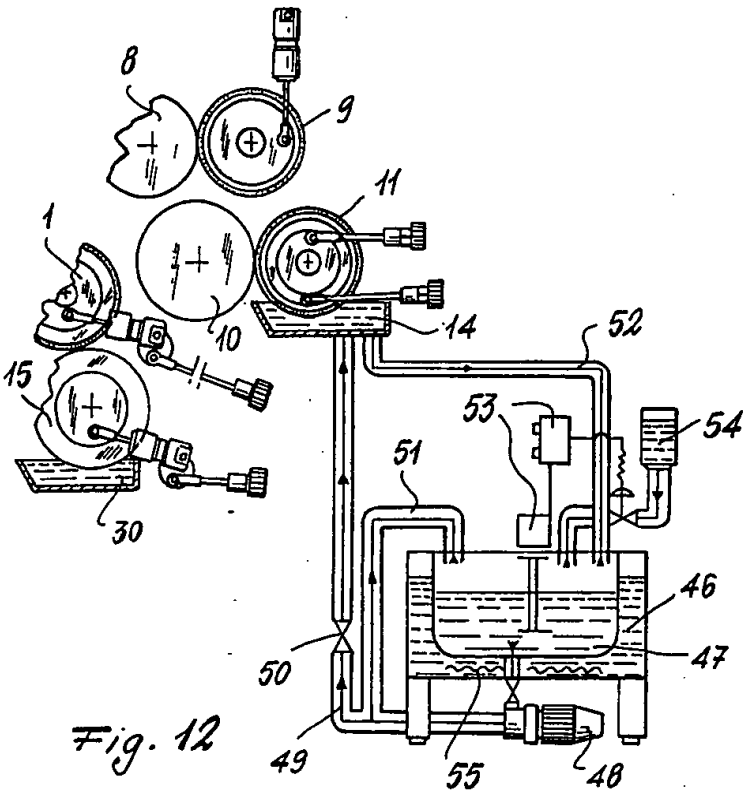

Fig. 12

SPECIFICATION

Reversible printing unit for off-set printing machines comprising wetting and painting devices

The present industrial invention application relates to a reversible printing unit for offset printing machines comprising wetting and painting devices, the term "painting" meaning a ultraviolet (UV) paint treating and/or a water or acrylic paint treatment.

For "reversibility" of the device there is meant the possibility of using this device not only as a painting assembly but, alternatively, also as a wetting assembly, in such a way as to cooperate with the inker rollers during the printing process proper.

A recent trend in this field has been that of painting the printed sheet by coating the preprinted sheet with a thin film of a suitable paint which covers the overall surface of the sheet (full primer) or only given regions thereof (register painting). Thus, the printed sheet acquires both a greater functionality and a greater advertising efficacy, since the printed colours appear as more glossy and contrast reacher.

Presently this suitable paint is coated by using a spreader element (provided in line after the printing elements), or by using, as painting elements, the convention wetting devices of the printing element.

In the first case the mentioned element may be used exclusively as a painting element, which is arranged in line with respect to the element provided for printing the several colours.

Accordingly, after being printed, the sheet arrives at the spreader-painting element which coats it with paint.

This approach is satisfactory from the quality standpoint; however operation drawbacks occur because of the complex structure of the element, as well as economic problems since this in-line painting elements are very expensive and, moreover, they may be used exclusively for the painting operation.

Furthermore, if the painting element is not provided during the printing machine making step, it is very difficult, or even impossible, to fit it inline to an already made printing machine (particularly if the printing machine is of an old type).

As, on the other hand, conventional wetting devices are used for carrying out the painting operation, a great number of problems occur because of the structural and operational characteristics of these systems.

In fact the wetting device is used for painting only by slightly modifying it and holding near unchanged the path of the paint through the rollers.

Since the mentioned path has been specifically designed for the wetting water, it should be easily apparent that it is not suitable for the spreading operation of the paint.

Moreover, during the switching from the wetting operation to the painting operation a very great time is lost for washing the device and the single supplying system which is used for both operations.

The main object of the present invention is that of evently spreading the paint film or, alternatively, moisten the plate by using rollers which, being movable away from one another, are effective to modify the path of the liquid supplied to the device, depending on that operation, of the three mentioned operations, is to be carried out.

This is made by suitably considering not only the different requirements of the wetting process with respect to the painting process, but also the different path which, during the painting operation, is to be selected depending on the paint type.

Yet another object is to overcome any drawbacks related to the switching from the wetting operation to the painting operation, by means of solutions effective to reduce the cleaning time and eliminate any manual operations by the operator during the switching from a working step to the other.

The reversible printing unit is essentially characterized in that it comprises, in combination,

(a) a first water or acrylic painting roller assembly,

(b) a second UV paint printing roller assembly, and

(c) a third wetting roller assembly for carrying out the wetting operation during the conventional offset printing, the rollers of said assemblies being effective to be differently associated to one another depending on the roller assembly which must operate.

A preferred embodiment of the invention is illustrated, by way of a non-limitative example, in the Figures of the accompanying drawings where:

Figure 1 illustrates the arrangement of the rollers near a plate-bearing cylinder, according to the present invention.

Figure 2 illustrates the device for driving the metering rollers and that for driving the painting roller.

Figure 3 illustrates the painting-wetting device during the stop step that is the step therein the water paint is supplied exclusively to the metering roller.

Figure 4 illustrates that same painting-wetting device during the water paint pre-coating step in which the water paint is precoated on the painting roller.

Figure 5 illustrates the painting-wetting device during the step in which the water paint is coated on the plate.

Figure 6A illustrates the painting-wetting device used for coating or spreading a U.V. paint during the stop and metering step.

Figure 7A illustrates the painting-wetting device during the pre-coating step in which U.V. paint is coated on the rollers.

Figure 8A illustrates the device during the step in which U.V. paint is coated on the plate.

Figure 6B illustrates the painting-wetting device used for coating U.V. paints by means of two painting rollers during the stop and metering step.

Figure 7B illustrates the painting-wetting device during the step in which U.V. paint is precoated on two painting rollers.

Figure 8B illustrates the device for coating U.V. paint on the plate by means of two painting rollers.

Figure 9 illustrates the device used as a wetting assembly during a stop step.

Figure 10 illustrates the device always used as a wetting assembly during the pre-wetting step.

Figure 11 illustrates the device used as a wetting assembly during the printing step, in which the wetting liquid, already supplied to the vibrating assembly, arrives at the inked plate.

Figure 12 illustrates the system for recirculating the U.V. paint.

For clarity the positions and working steps thereinabove disclosed may be defined as follows:

A) Device used for painting by water or acrylic paints (Figs. 3–4–5).

B) Device used for painting by U.V. paints (Figs. 6–7–8).

C) Device used for wetting or moistening (Figs. 9–10–11).

With reference to Fig. 1, the device comprises four inker rollers 3, 4, 5 and 6, an inker-painting roller 2 and a painting roller 1 which can be brought into contact with the plate of the cylinder A and moved away from said cylinder. The inker rollers 3, 4, 5 and 6 are respectively coupled by intermediate vibrating rollers 12 and 13 in turn contacting other rollers (not shown) which form, with said inker rollers, an integrating part of the vibrating assembly of a printing machine.

The plate-bearing cylinder A is driven to rotate by a dedicated motor (not shown), and rotates according to the arrow F, while the inker rollers 3–6 and inker-vibrator roller 2 are driven to approach the cylinder A and move away therefrom by means of conventional supporting members 41.

The first inker roller 3 can be coupled to the inker-painting roller 2 by means of a coupling vibrating roller 7, this vibrating roller 7 being provided with an eccentric bush 39 and pneumatic cylinder 40.

The inker-painting roller 2 contacts a vibrating roller 8 which operates in a similar way as the rollers 12 and 13 and which vibrating roller, in turn, contacts a transfer roller 9 which can be brought, by means of an eccentric bush 37 and pneumatic cylinder 38, into contact with a metering roller 10. The metering roller 10 contacts a metering roller 11, and it is possible to vary the mutual contacting pressure by means of eccentric bushes 44 and 45 provided on the roller 11 and which may be adjusted by means of tie-rods 31 and 32. The roller 11 is constantly immersed within a first tray 14 provided for holding a wetting liquid (water-alchohol) or a U.V. (ultraviolet) paint.

The painting roller 1 is provided with an eccentric bush 33 and pneumatic cylinder 34 which can be controller through a tie-rod 42 in such a way as to be brought to several positions, as it will become more apparent thereinafter. Said roller is provided for contacting a metering roller 15 which is constantly immersed within a tray 30 holding a water or acrylic paint (which thereinafter will be simply called "water paint").

The roller 15 is provided with an eccentric bush 35, a pneumatic cylinder 36 and adjusting tie-rod 43.

The rollers 10 an 11 operate to coat or spread the product held in the tray 14 in the form of a thin and even film (of wetting liquid or U.V. paint).

The painting roller 1 may contact exclusively the metering roller 15 or the metering roller 15 and the cylinder-plate A or it may be removed from both these elements.

Finally, with the painting roller 1 the metering roller 15 cooperates, which may be moved to and away from the painting roller 1.

All of the inker rollers 3 to 6, the inker-painting roller 2 and painting roller 1 are coated by a resilient material, usually a rubber having a suitable hardness and a surface roughness.

Likewise, the transfer roller 9 and metering roller 11 are coated by a rubber having different hardness and roughness.

The vibrating roller 12 and 13, as well as the vibrating roller 8 and coupling roller 7 are provided with a plastics material (Rilsan) coating effective to favour a perfect spreading of the ink and, in the case of the vibrating rollers 8 and 7, of the wetting liquid or, alternatively, of the U.V. paint on the rollers arranged near the mentioned rollers.

The metering roller 15, provided with a chromium plated surface, operated to coat the surface of the painting roller 1 with the water paint.

The metering roller 10 is also provided with a chromium plated and roughened surface.

According to the provided embodiment of the present invention, the vibrating rollers 12 and 13 and 8 are driven with a translation motion in order to better spread the ink on the contacting inker rollers.

Moreover, these rollers are driven in such a way as to constantly rotate with the speed of the plate-bearing cylinder A.

The coupling vibrating roller 7 is also pro-

vided with a translation movement.

The painting roller 1 is driven by a mechanism including gear and free wheels so designed as to cause said roller to rotate with a speed approximatively equal to that of the plate-bearing cylinder A and cause said roller to continuously rotate, by a friction or gear drive, even if, after disengaging from the stopped plate-bearing cylinder A, it is held in contact with the metering roller 15 which continues to rotate.

As is shown in Fig. 2, the metering roller 10 is driven, through the gear wheels 27 and 26, by a dedicated motor 28 operating with a variable speed, that is with a speed which is independent from that of the plate bearing cylinder A, and is provided with a gear wheel 25 by means of which is drives the gear wheel 24 arranged on the pivot pin of the metering roller 11.

The specific gear ratio of the two metering rollers 10 and 11, which are held into contact by friction, with respect to the gear ratio of the gear drive, causes a slight offset of the peripheral speeds of said metering rollers.

This condition, jointly to the feature of adjusting the position of the metering roller 11 with respect to the metering roller 10 in an independent way on the two sides by acting, through the adjusting tie-rods 31 and 32 (Fig. 1), on the two eccentric bushes 44 and 45, in which there are mounted the pivot pins of the roller 11, affords the possibility of evenly coating or spreading the wetting liquid or U.V. paint supplied on their surfaces.

The motor 28 also drives the metering roller 15 through the gear wheel 29 arranged on the pin of said metering roller 15.

The metering roller 15, mounted on an eccentric bush 35 driven by the pneumatic cylinder 36, may be moved toward and away from the painting roller 1. The tie rods 42 and 43 operate to adjust the position of the metering roller 15 with respect to the painting roller 1, in an independent way on the two sides.

The inker rollers 3 to 6 and inker-painting roller 2 may be moved away from the plate bearing cylinder A by means of the supporting members 41, *known per se*, which are provided with suitable mechanisms for driving them.

In the same way, the vibrating roller 7 and transfer roller 9 may be moved away from one of the rollers contacted thereby in a completely automatic way, depending on the use of the device and its working steps.

More specifically, whereas the coupling driving roller 7 is supported by means of the eccentric bush 39 thereon the pneumatic cylinder 40 operates, the transfer roller 9 is supported on an eccentric bush 37 driven by the cylinder 38.

The painting roller 1 may be moved away from the plate bearing cylinder A. To this end, there is provided an eccentric bush 33, driven by the pneumatic cylinder 34, which affords the possibility of displacing the roller with respect to the plate bearing cylinder A.

According to a preferred embodiment of the invention, the painting roller 1 is reciprocated along the axis with a reciprocating motion from right to left and from left to right.

This reciprocating motion affords the possibility of perfectly spreading the water paint.

Fig. 2, in addition to the disclosed device for driving the metering roller 10 (and accordingly the metering roller 11) and metering roller 15, illustrates the gear driving mechanism for driving the painting roller 1.

This mechanism permits the roller to be always held in a driven condition, that is it is driven either by the plate-bearing cylinder A or by the metering roller 15.

On the pivot pin of the painting roller 1 there is arranged the gear wheel 16 cooperating with the gear wheel 17 rigid with the gear wheel 18 mounted on a free wheel (not shown).

The gear wheel 18 is driven by the gear wheel 19 which is mounted, in the illustrated embodiment, on the pivot pin of the vibrating roller 12 rotating with a speed equal to that of the plate-bearing cylinder A.

This is obtained by means of the gear wheel 20 which cooperates with the gear wheel 21 of the plate-bearing cylinder.

The painting roller 1 may be driven, other than by the vibrating roller 12 (as shown in Fig. 2 for facility) directly by the plate-supporting cylinder A or by the vibrating roller 8 or by another roller driven by the plate supporting cylinder A.

Thus, the painting roller 1 rotates with the same speed as the plate supporting cylinder A, as said cylinder is driven.

However, since the paint is to be always held in recirculation on the surface of the rollers, it is necessary that the painting roller 1 be able of continuously rotating even after being disengaged from the already stopped plate supporting cylinder A.

Because of this reason there are provided a further gear wheel 22, mounted on the pin of the painting roller 1 through a free wheel and a gear wheel 23 mounted on the pin of the metering roller 15 and meshing with one another.

In the case of a stopping during the painting step, the plate supporting cylinder A is also stopped while the painting roller 1, which is now separated from the plate supporting cylinder A, continuously rotates driven by the gear wheel 22.

Under these conditions, in fact, the free wheel arranged inside the gear wheel 18 allows for the two gear wheels 16 and 17 to rotate, whereas the gear wheels 18, 19, 20 and 21 held in a rest condition.

Moreover, as, during the washing step, the plate supporting cylinder A is rotated in a op-

posite direction to the printing direction, the gear wheel, disengaged from the gear 18 causes the gear wheel 19 and other gears associated therewith, and, accordingly, the painted roller 1, not to be counterrotated, in such a way as to damage the painting roller 1.

The free wheel of the gear wheel 22 allows for the painting roller 1, during the printing step, to rotate with a speed equal to that of the plate supporting cylinder A thereby disengaging from the driving of the gear wheel 22 of the metering roller 15, the speed of which is independent from that of the plate supporting cylinder A.

Thus, the free wheels act both as speed exceeding member and as an anti-return device.

A further object of the present invention is to provide such a device which affords the possibility of easily switching from the use of the paint to that of the wetting water while obtaining, in both processes, optimal results independent from the reversibility of the system.

The following disclosure illustrates the manner in which a new arrangement of the rollers, cooperating in a different way depending on the carried out operation (water painting, U.V. painting or printing and then wetting) affords the possibility of achieving the intended object.

A–*Device for acrylic or water paint*

The so called "water paints" or "acrylic paints", because of their very high drying speed, must be held in a continuous recirculation by the roller of the painting device and must be transferred in a time as small as possible on the support to be painted. Accordingly it is necessary to use a particular configuration for the device made according to the present invention.

The inker rollers 3 to 6 are held disengaged while also the painting roller 2 is removed from the plate and the transfer roller 9 removed from the metering roller 10.

The paint, supplied from the tank 30 is metered by the metering roller 15 and, accordingly, immediately transferred to the plate through the painting roller 1.

The operation comprises three steps:

–supplying of the paint to the roller 15 (Fig. 3)

–pre-coating of the paint on the painting roller 1 (Fig. 4)

–coating of the paint on the plate (Fig. 5).

At the start, the painting roller 5 is held separated by the plate and metering roller 15, while the paint arrives at said metering roller 15 from the tank 30.

After a short period of time, the painting roller 1 is brought into contact with the metering roller 15 which transfers thereto the paint for precoating said paint thereon.

During this step, the roller is held removed from the plate bearing cylinder A and rotates with a speed approximatively equal to that of the metering roller 15, driven by the gear 22 meshing with that of the metering roller 23 (Fig. 2).

During the last step of this painting operation, the plate supporting cylinder A starts to move and the painting roller 1 contacts it and coats the paint thereon.

According to the already disclosed operation of the gear drive, the painting roller 1 rotates now with a speed approximatively equal to that of the plate supporting cylinder A.

At the start of this step, the metering rollers 10 and 11 rotate with a speed greater than that of the normal operation, for a time period which can be set from 0 to 20 seconds.

According to a preferred example of the invention, in the case of a short interruption of the painting operation, the painting roller 1 is held in contact with the metering roller 15, which continues to rotate, while it moves away from the plate bearing cylinder A.

Thus, the device assumes again a configuration like that provided from the pre-coating or prespreading step in which the paint is precoated on the painting roller 1 (Fig. 4).

During this time period, the paint is continuously recirculated on both the rollers 1, 15 included in the device.

The above mentioned operation steps and the short path of the acrylinc paint or water meet the working conditions imposed by the physical-chemical characteristics of this particular paint and mainly those of its quick drying.

B–*Device used for U.V. paints*

Printing tests have shown that, as U.V. paints are used for the painting operation, it is necessary to use a proper number of rollers effective to assure a perfect coating of the paint film before the paint reaches the plate.

Due to this reason, an advantageous embodiment of the invention provides for the use of the most part of the rollers included in the painting-wetting device, any time U.V. paints are used for the painting operation.

The inker rollers 3 to 6 are separated from the plate bearing cylinder A and the coupling vibrating roller 7 is removed from the first inker roller 3 in such a way as to switch off the inking and vibrating assembly.

The operation of the metering roller 11, contacting the metering roller 10, assures a perfect spreading of the paint film.

The paint arrives at the painting roller 2 through the transfer roller 9 and vibrating roller 8.

The combined operation of the vibrating rollers 7 and 8 affords the possibility of coating on the painting roller 2 the paint supplied by the tank 14 and metering that paint, the so-

called excess paint, taken up from the plate by the painting roller.

In the operation it is possible to distinguish three operating steps;

–Metering of the U.V. paint by the metering rollers 10 and 11 (Fig. 6/A)

–Pre-coating of the paint on all of the rollers of the device (Fig. 7/A)

–Coating of the paint on the plate (Fig. 8/A).

At the start of the working step, the inker rollers 3 to 6 are spaced from the plate bearing cylinder A and the coupling vibrating roller 7 is removed from the first inker roller 3.

For the overall duration of the painting operation by means of U.V. paints, the painting roller 1 is held separated from the plate A and the metering roller 15 from the painting roller 1.

Simultaneously, the painting roller 2 is remove from the plate bearing cylinder A and the transfer roller 9 is disengaged from the metering roller 10.

As the painting operation continues, the metering roller 10 and 11 are driven and meter the paint which is present on their surface.

After a preset period of time corresponding to few seconds, the transfer roller 9 contracts the metering roller 10.

Thus the paint pre-coating step is started (Fig. 7/A) during which step the paint stream flows through the metering device and arrives, through the transfer roller 9 and vibrating roller 8, at the painting roller 2.

During this period of time, the painting roller 2 is held separated from the plate bearing cylinder A.

The pre-coating step continues as far as the paint has been evenly coated on the surface of all of the rollers of the device and, in particular, on the painting roller which will transfer it to the plate bearing cylinder A.

At the end of this paint pre-coating step, the painting roller 2 contacts the plate bearing cylinder A and coats paint thereon.

At the start of this last step, the metering rollers 10 and 11 rotate with a greater speed for some seconds, in such a way as to compensate of the complete absence of paint on the plate bearing cylinder A.

In a case of a stop during the painting operation, the rollers of the device assurme the arrangement provided for the paint precoating step, and the paint is continuously recirculated in such a way as to prevent waste from occurring at the restart of the operation.

An advantageous modified embodiment of the device provides for the use of both the painting rollers 1 and 2 for coating ultraviolet paints.

This object is achieved due to the fact that the painting roller 1 may be now located in five very different positions that is:

–a position separated form the plate bearing cylinder A, by the metering rollers 15 and 10;

–a position separated by the plate cylinder A and metering roller 10 but in contact with the metering roller 15 (during the coating or spreading of water-base paints);

–a position separated from the metering roller 10 and in contact with the plate beating cylinder A and metering roller 15 (also during the water paint coating);

–a position separated by the plate bearing cylinder A and metering roller 15, but contacting the metering roller 10 (during the disclosed U.V. paint coating step);

–a position separated from the metering roller 15 and contacting the plate bearing cylinder A and metering roller 10 (also during the U.V. paint coating step).

In operation, the painting roller 1 takes up a portion of the paint from the metering roller 10 and coats it on the plate, while the remaining paint arrives at the plate through the painting roller 2.

Thus, the painting roller 1 coats the most portion of the paint on the plate, while the painting roller 2 acts as a metering member, since the painting supplied onto its surface is evenly coated as a very thin film, in an amount which is less than that supplied to the painting roller 1.

The variation thereinabove mentioned includes some operation differences which are due to the use of two painting rollers.

More specifically, the positions assumed by the inker rollers 3 to 6 and coupling roller 7 being the same, the painting roller 1 is held spaced from the metering roller 15, but it is brought to contact the metering roller 10 and hence the plate bearing cylinder A.

Thus, at the start of the operation, the painting rollers 1 and 2 are held removed from the plate bearing cylinder A, while the transfer roller 9 is disengaged from the metering roller 10.

After the metering of the paint by the metering rollers 10 and 11, the painting roller 1 is brought into contact with the metering roller 10 (Fig. 6/B) thereby taking up paint.

Then, during a second period of time, the transfer roller 9 is caused to approach the metering roller 10 (Fig. 7/B) thereby allowing for the paint to reach the painting roller 2. Then the third U.V. paint coating step on the plate A is started, during which step the painting rollers 1 and 2 contact the plate and coat thereon the paint (Fig. 8/B).

During this U.V. painting steps, by using two painting rollers, the gear drive of the painting roller 1 (shown in Fig. 2) operates according to the operation principle disclosed for the case of the water paint coating operation.

From practical printing and laboratory tests it has been found very useful to heat the U.V. paint before sending it to the support to be painted.

Accordingly, the invention provides a parti-

cular device for circulating the U.V. paint (Fig. 12) which, in addition to assuring the recirculation of the paint, holds said paint at the set temperature value. By adopting this approach, according to the invention, it is possible to obtain the desired brightness of the printed sheet while favouring the drying of the paint and its perfect anchoring to the support. The device associated to the tank 14 consists of a vessel 47, holding the paint, arranged inside a temperature controlled tank 46, in which there are arranged the electric resistances 55.

The paint exiting the vessel 47 is conveyed through the pump 48 to the tank 14 through the supplying duct 49.

Through the above mentioned supplying duct 49 there is arranged a cock 50 to adjust the flow rate therethrough, in such a way as to supply the excess paint to the vessel 47 through the duct 51. From the tank or tray 14, the paint is returned to the vessel 47 through the outlet duct 52, to be recirculated again.

The U.V. paint supplying system may be subjected to an advantageous variation by using a viscosimeter 53 to hold constant the viscosity of the paint and adjust the percent concentration of the solvent arriving at the paint vessel 47 supplied from the yessel 54.

The arrangement of the rollers of the painting-wetting device affords the possibility of automatically washing the rollers, at the end of the painting step by water or U.V. paints.

In order to carry out said washing operation, it will be sufficient to set the device to the paint pre-coating step and supply to the trays 14 and 30 water or other washing liquid, instead of paint.

The combined operation of the rollers assures a perfect washing of their surfaces without the need of carrying out manual cleaning operations.

C–*Device used as a wetting assembly*

The invention provides for the possibility of also using the device as a wetting assembly for carrying out the offset printing operation. From the Italian patent No. 2922A/83 there is known a wetting device operating for moisting the vibrating assembly and then transferring to the plate ink and wetting solution in a mutual equilibrium condition.

The device according to the present invention holds unchanged the characteristics and objectives of the above mentioned wetting device, by providing a plurality of rollers with alternating different surfaces and cooperating according to the same operating principle.

The sole difference between the painting-wetting device and the exclusively wetting device is the absence, in the first, of an additional inker roller and hence the reduction of the number of the inker rollers from 6 to 5.

The operating steps are held unchanged and, accordingly it will comprise the following steps:

–a rest or stop step (Fig. 9);
–a pre-wetting step (Fig. 10);
–a wetting step (Fig. 11).

At the start of the printing operation, the inker rollers 3 to 6 are held separated from the plate bearing cylinder A, as it it shown in Fig. 9.

The coupling vibrating roller 7 approaches the first inker roller 3.

The metering rollers 10 and 11 are started and they meter the wetting solution (water-alcohol) taken up from the tray 14 (Fig. 10).

In the meanwhile, the inker-painting roller 2 contacts the plate bearing cylinder A, while the transfer roller 9 contact the metering roller 10.

For the overall duration of the wetting operation, the painting roller 1 is disengaged both from the metering rollers 15 and 10 and from the plate bearing cylinder A.

During this pre-wetting step, the water-alcohol solution arrives, through the vibrating roller 7, at the first inking roller 9 and hence at the vibrating assembly.

The operation of all of the inking and vibrating rollers permits to achieve the proper water-alcohol-ink equilibrium condition, which is an indispesnable condition for a good printing.

At the end of the pre-wetting step, the inker rollers 3 to 6 contact the plate bearing cylinder A and send thereto the already stabilized water-alcohol-ink composition (Fig. 11).

CLAIMS

1. A reversible printing unit, characterised in that it comprises, in combination (a) a first water or acrylic painting roller assembly, (b) a second U.V. paint printing roller assembly, and (c) a third wetting roller assembly for carrying out the wetting operation during the convention offset printing, the rollers of said roller assemblies being effective to be differently associated to one another depending on the assembly which must operate.

2. A reversible printing unit according to Claim 1, characterised in that said first roller assembly consists of a first metering roller which is partially immersed in a first tray holding water or acrylic paint, and a first wetting and painting roller effective to be associated to said first metering roller and to a plate bearing cylinder.

3. A reversible printing unit according to Claim 1, characterised in that said second roller assembly consists of a second metering roller, partially immersed in a second tray holding the wetting liquid or U.V. paint, a third metering roller, a first transfer roller, a first vibrating roller, a first inker-painting roller and said plate-bearing cylinder.

4. A reversible printing unit, according to Claim 3, characterised in that with said second assembly is associated with the first

painting roller located between said third metering roller and said plate-bearing cylinder.

5. A reversible printing unit according to Claim 1, characterised in that said third assembly consists of said second metering roller, said third metering roller, said first transfer roller, said first vibrating roller, said first inker-painting roller, a coupling vibrating roller and a plurality of inker rollers forming a part of a conventional vibrating assembly.

6. A reversible printing unit, according to the preceding claims, characterised in that said third metering roller is driven, through gear wheels, by a dedicated motor operating with a variable speed and independent from that driving said plate-bearing cylinder and is provided with a gear wheel for driving a gear wheel arranged on the pivot pin of said second metering roller, the gear ratio of said third metering roller and said second metering roller, which are held in friction contact with one another, with respect to the gear ratio of the gear drive, causing a slight offset of their peripheral speeds.

7. A reversible printing unit, according to Claim 6 characterised in that on the pivot pin of the first painting roller there is arranged a first gear wheel cooperating with a second gear wheel and a third gear wheel mounted on a free wheel, said third gear wheel being driven by a fourth gear wheel mounted on the pivot pin of a conventional vibrating middle roller the peripheral speed of which corresponds to that of said plate-bearing cylinder, on the pivot pin of said first vibrating roller there being mounted a fifth gear wheel and related free wheel and meshing with a fifth gear wheel keyed on said metering roller.

8. A reversible printing unit, according to the preceding claims, characterised in that said first painting roller assumes, depending on the selected printing type, the following positions:–

–a position separated from the plate-bearing cylinder, from the first metering roller and third metering roller;

–a position separated from the plate-bearing cylinder and the third metering roller, but in contact with the first metering roller;

–a position separated from the third metering roller and in contact with the plate-bearing cylinder and first metering roller;

–a position separate from the plate-bearing cylinder and first metering roller and in contact with the third metering roller;

–a position separated from the first metering roller and in contact with the plate-bearing cylinder and third metering roller.

9. A reversible printing unit, according to Claim 1, characterised in that it is provided with a device for recirculating the U.V. paint and holding said paint temperature at the optimum value.

10. A reversible printing unit according to Claim 9, characterised in that said recirculation device comprises means for controlling said paint viscosity.

11. A reversible printing unit according to Claim 9, characterised in that said recirculation and heating device consists of a paint collecting vessel, a temperature controlled tank including heating electric resistance, the paint supplied from said vessel being pumped toward said second tray through a supplying duct provide with a cock for adjusting the flow rate, the excess of paint being returned to the vessel through a duct.

12. A reversible printing unit according to Claim 10, characterised in that said means for controlling said paint viscosity comprise a viscosity meter driving a valve associated with a solvent vessel.

13. A reversible printing unit according to one or more of the preceding claims, characterised in that the first painting roller, first metering roller, second metering roller, first transfer roller and coupling vibrating roller may be moved away from thier axes by means of eccentric bushes driven by a pneumatic cylinder.

14. A reversible printing unit substantially as described herein with reference to and as illustrated in the accompanying drawings.

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(54) Schalteinrichtung für ein kombiniertes Feucht- und Lackierwerk

Die Erfindung betrifft eine Schaltvorrichtung für ein kombiniertes Feucht- und Lackierwerk in Bogenoffsetdruckmaschinen.
Die Aufgabe, Schaffung einer Schaltvorrichtung für ein kombiniertes Feucht- und Lackierwerk, die sowohl im Feuchtbetrieb, die sich günstig auf den Druckprozeß auswirkende Vorfeuchtung der Feuchtauftragwalze beibehält, als auch im Lackierbetrieb ein Verkleben der Lackauftragwalze verhindert, wird dadurch gelöst, daß unterhalb eines Doppelhebels der Schaltvorrichtung ein Umschalter für Feucht- und Lackierbetrieb in Form eines verstellbaren Exzenters angeordnet ist.

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Erfindungsansprüche

1. Schaltvorrichtung für ein kombiniertes Feucht- und Lackierwerk, welches aus einer Tauchwalze, einer Übertragungswalze und einer elastisch ummantelten Auftragwalze besteht, gekennzeichnet dadurch, daß unterhalb eines Doppelhebels (10) der Schaltvorrichtung (20) ein Umschalter für Feucht- und Lackierbetrieb in Form eines verstellbaren Exzenters (16) angeordnet ist.

2. Schaltvorrichtung nach Punkt 1, gekennzeichnet dadurch, daß die Schaltvorrichtung (20) aus einem Schwenkhebel (7) und dem Doppelhebel (10) besteht, die miteinander kraftschlüssig verspannt sind, wobei der Drehpunkt des Doppelhebels (10) koaxial zur Drehachse der Übertragungswalze (3) und der Drehpunkt des Schwenkhebels (7) im Doppelhebel (10) angeordnet ist.

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Leipzig, den 27.03.1984

Titel

Schaltvorrichtung für ein kombiniertes Feucht- und Lackierwerk

Anwendungsgebiet

Die Erfindung betrifft eine Schaltvorrichtung für ein kombiniertes Feucht- und Lackierwerk in Bogenoffsetdruckmaschinen.

Charakteristik der bekannten technischen Lösungen

In den letzten Jahren wurde die Nachfrage nach hochveredelten Druckprodukten immer größer, d. h. die Druckindustrie stand vor der Aufgabe, die Druckprodukte mit einem glänzenden, scheuerfesten Überzug zu versehen. Aus Effektivitätsgründen wird aus diesem Grund in der DE-PS 2020854 vorgeschlagen, das Feuchtwerk des letzten Druckwerkes als Lackierwerk einzusetzen. Dadurch kann in einem Druckdurchgang der Druckbogen mit Farbe bedruckt und lackiert werden.

Da ein Lackieren nicht für jeden Druckauftrag notwendig ist, besteht das Erfordernis, daß Feuchtwerke der letzten Druckwerke entweder als Lackierwerk oder Feuchtwerk einzusetzen sind. Dem jeweiligen Betriebszustand entsprechend müssen verschiedene Schaltvarianten der Auftragwalze speziell bei Druckunterbrechungen (z. B. Haltstoppern) realisiert werden.
Im Feucht- wie im Lackierbetrieb ist eine Walzentrennung zwischen der Auftragwalze und dem Plattenzylinder vorzunehmen, um einmal die Feuchtmittelzufuhr bzw. Lackzufuhr zu unterbinden und zum anderen der Walzenabplattung durch die Pressung vorzubeugen. Von der letzten Erscheinung wäre insbesondere die Auftragwalze betroffen, da diese mit einem elastischen Material ummantelt ist.
Aus diesen Gründen erfolgt im Feuchtbetrieb bei Druckunterbrechung die Walzentrennung derart, daß die Auftragwalze vom Plattenzylinder als auch von der Übertragungswalze getrennt wird.
Bei Druckfortsetzung erfolgt die Auftragwalzenanstellung gemäß der DE-AS 1611263 derart, daß die Auftragwalze zuerst mit der Übertragungswalze, um das für den Fortdruckprozeß günstige Vorfeuchten der Auftragwalze zu erreichen und dann mit dem Plattenzylinder in Berührung gebracht wird. Diese Zustellbewegung erfolgt über ein kompliziertes Getriebe mit hohem manuellem Aufwand bei der Justage der Auftragwalze gegenüber der Übertragungswalze und dem Plattenzylinder.
Für den Lackierbetrieb ist diese Schaltmöglichkeit der Auftragwalze bei Druckunterbrechung ungünstig, da ein Verkleben der Lackauftragwalze mit der auf ihr angeordneten Verreibwalze durch die Restlackschicht auftreten würde.
Aus diesem Grund wird in den M.A.N. Roland Nachrichten 44 bei einem Lackierwerk vorgeschlagen, die Auftragwalze während Druckunterbrechungen nur von dem Plattenzylinder abzustellen. Der Körperkontakt Auftragwalze - Übertragungswalze bleibt erhalten, wobei die Übertragungswalze von der Tauchwalze und somit auch die Auftragwalze mit Hilfsdrehzahl angetrieben wird. Ein Antrocknen der Restlackschicht wird somit vermieden, da eine Walzenverbindung zum Lackvorratsbehälter aufrechter-

halten wird. Mit welchen Mitteln diese Schaltmöglichkeit zu realisieren ist, wird in dem Prospekt von der M.A.N. Roland nicht aufgezeigt.

Ziel der Erfindung

Ziel der Erfindung ist es, eine Schaltvorrichtung für ein kombiniertes Feucht- und Lackierwerk zu schaffen, wobei die Umstellung von Feuchten auf Lackieren mit den dazu erforderlichen Schaltmöglichkeiten der Auftragwalze mit einfachen Mitteln erfolgt.

Aufgabe der Erfindung

Die Aufgabe der Erfindung besteht in der Schaffung einer Schaltvorrichtung für ein kombiniertes Feucht- und Lackierwerk, die sowohl im Feuchtbetrieb, die sich günstig auf den Druckprozeß auswirkende Vorfeuchtung der Feuchtauftragwalze beibehält, als auch im Lackierbetrieb ein Verkleben der Lackauftragwalze verhindert.

Ausführungsbeispiel

Die Erfindung soll nachfolgend anhand eines Ausführungsbeispiels näher erläutert werden.
Die zugehörige Zeichnung zeigt den prinzipiellen Aufbau der Schaltvorrichtung.
Entsprechend den bekannten Feuchtwerkkonstruktionen ist eine Tauchwalze 1 so angeordnet, daß deren Oberfläche mit der im Feuchtmittelkasten 2 enthaltenen Flüssigkeit in Körperberührung

steht. Nahezu senkrecht über der Tauchwalze 1 ist eine Übertragungswalze 3, deren Oberfläche verchromt ist, angeordnet. Als Verbindungswalze zwischen der Übertragungswalze 3 und einem Plattenzylinder 4 dient eine elastisch ummantelte Auftragwalze 5.
Die weitere Beschreibung ist auf ein Walzenende 6 beschränkt, da die Ausführung des anderen Walzenendes in jeder Weise gleich ist.
An dem Walzenende 6 ist ein Schwenkhebel 7 drehbar befestigt, welcher mittels einer Druckfeder 8 und einer Federstange 9 mit einem am Wellenstumpf der Übertragungswalze 3 gelagerten Doppelhebel 10 verbunden ist. Der Schwenkhebel 7 ist außerdem im Befestigungspunkt 11 beweglich am Doppelhebel 10 angeordnet. Ebenfalls am Schwenkhebel 7 ist ein Übertragungselement 12, welches mit einem Arbeitszylinder 13, der als Zweistellungszylinder ausgebildet ist, befestigt.
Im Doppelhebel 10 ist eine erste Einstellschraube 14 und eine zweite Einstellschraube 15 eingeschraubt. Beide Schrauben sind mit nicht dargestellten Skalierungen versehen.
Die erste Einstellschraube 14 stützt sich gegen das Gestell und die zweite Einstellschraube 15 gegen den Schwenkhebel 7 ab. Unterhalb des freien Endes des Doppelhebels 10 ist ein Exzenter 16 drehbar im Maschinengestell gelagert. Über ein Abtriebselement 17 und eine Koppelstange 18 ist der Exzenter 16 mit einem Hydraulikzylinder 19, welcher im Maschinengestell gelagert ist, verbunden. Der Hydraulikzylinder ist in den beiden Stellungen I und II bewegbar.
Über der Auftragwalze 5 befindet sich eine Farbauftragwalze 21, die über eine schaltbare Zwischenwalze 22 mit der Auftragwalze 5 in Verbindung gebracht werden kann.

Die Wirkungsweise ist folgende:
Zuerst wird die Wirkungsweise der Schalteinrichtung für den Feuchtprozeß beschrieben.
Der Hydraulikzylinder 19 wird aus diesem Grund in die Stellung I bewegt, wodurch der Exzenter 16 über die Koppelstange 18 und das Abtriebselement 17 in die durchgezogene Stellung bewegt

wird.
Durch die Drehbewegung der in den Feuchtmittelkasten 2 eintauchenden Tauchwalze 1, die von einem nicht dargestellten regelbaren Elektromotor erfolgt, wird die Feuchtflüssigkeit über die Übertragungswalze 3 und die Auftragwalze 5 auf die auf den Plattenzylinder 4 aufgespannte Druckplatte übertragen. Um zu vermeiden, daß bei längerer Druckunterbrechung über die als Zwischenwalze 22 zum Farbwerk geschaltene Verreibwalze Feuchtmittel in das Farbwerk gelangt und zwischen Auftragwalze 5 und Übertragungswalze 3 eine Deformierung der Walzenoberfläche entsteht, muß die Auftragwalze 5 vom Plattenzylinder 4 und der Übertragungswalze 3 abgestellt werden. Dazu wird mittels Druckluft der Kolben des Arbeitszylinders 13 in die Stellung b bewegt, wodurch die Feuchtauftragwalze 5 auf der Übertragungswalze 3 verschwenkt wird. Dabei wird der Schwenkhebel 7 und der Doppelhebel 10 gemeinsam um den Drehpunkt der Übertragungswalze 3 bis zum gestellfesten Exzenter 16, welcher sich in der durchgezogenen Stellung befindet, bewegt.
Dadurch wird die Feuchtauftragwalze 5 von der Übertragungswalze 3 abgehoben. Der Doppelhebel 10 verbleibt dabei in seiner bereits eingenommenen Lage, an dem Exzenter 16 anliegend. Lediglich der Schwenkhebel 7 wird im Befestigungspunkt 11 verdreht, wobei die Wegdifferenz durch die Federüberdrückung der Feder 8 aufgenommen wird. Beim Anfahren der Maschine erfolgt der Bewegungsablauf der Auftragwalze 5 in umgekehrter Reihenfolge.
Vor Schwenken des Arbeitszylinders 13 von b nach a wird der Arbeitszylinder 19 von I nach II geschwenkt. Hierdurch wird der Exzenter 16 in die strichlierte Stellung gebracht und die Auftragwalze 5 an die Übertragungswalze 3 geschwenkt. Hierdurch ist eine Vorfeuchtung der Auftragwalze 5 nach Erfordernis möglich. Nach einer wählbaren Zeit einer nicht näher beschriebenen Zeitschaltung zwischen Arbeitszylinder 13 und 19 wird der Arbeitszylinder 13 von b nach a gebracht. Die vorgefeuchtete Auftragwalze 5 erhält Körperkontakt mit dem Plattenzylinder 4.

Mittels der ersten Einstellschraube 14 kann die Pr ssung der Auftragwalze 5 gegenüber dem Plattenzylinder 4 und mittels der zweiten Einstellschraube 15 die Pressung gegenüber der Übertragungswalze 3 genau reproduzierbar eingestellt werden. Soll nun das Feuchtwerk als eines der letzten Druckwerke als Lackierwerk eingesetzt werden, so erfolgt zuerst ein Abstellen der Farbauftragwalzen in bekannter Art und Weise.
Nun wird der Hydraulikzylinder 19 in die Stellung II bewegt, wodurch der Exzenter 16 die gestrichelte Stellung einnimmt. Jetzt kann der normale Lackierbetrieb aufgenommen werden. Kommt es zu einem normalen Maschinenhalt, z. B. durch einen Stopper, so wird wie im Feuchtbetrieb der Arbeitszylinder 13 von Stellung a nach b gebracht, Doppelhebel 10 und Schwenkhebel 7 schwenken gemeinsam um den Mittelpunkt der Übertragungswalze 3. Hierdurch hebt die Auftragwalze 5 vom Plattenzylinder 4 ab und bleibt im Kontakt mit der Übertragungswalze 3. Die Tauchwalze 1 wird auf eine Hilfsdrehzahl (hier nicht näher beschrieben) gebracht und bleibt im Kontakt mit der Übertragungswalze 3. Somit verbleiben über die Dauer des Maschinenhaltes Tauchwalze 1, Übertragungswalze 3 und Auftragwalze 5 im Körperkontakt. Ein Eintrocknen der Lackschicht ist somit ausgeschlossen.
Bei einem längeren Maschinenhalt wird der Arbeitszylinder 19 in die Stellung I gebracht und somit der Exzenter 16 gegen den Hebel 10 geschwenkt, was ein Abheben in oben beschriebener Weise der Auftragwalze 5 von der Übertragungswalze 3 bewirkt. Hierdurch wird eine Abplattung der Auftragwalze 5 vermieden.
Vollständigkeitshalber sei noch erwähnt, daß die Auftragwalze 5 in abgestelltem Zustand nicht außer Zahneingriff mit dem Plattenzylinderantriebsrad gebracht wird, so daß die Auftragwalze 5 entsprechend der DE-OS 2822350 mit einem Freilauf ausgerüstet sein muß, um die Umfangsgeschwindigkeit der Tauchwalze 1 annehmen zu können.

Bezugszeichenaufstellung

1	Tauchwalze
2	Feuchtmittelkasten
3	Übertragungswalze
4	Plattenzylinder
5	Auftragwalze
6	Walzenende
7	Schwenkhebel
8	Druckfeder
9	Federstange
10	Doppelhebel
11	Befestigungspunkt
12	Übertragungselement
13	Arbeitszylinder
14	erste Einstellschraube
15	zweite Einstellschraube
16	Exzenter
17	Abtriebselement
18	Koppelstange
19	Hydraulikzylinder
20	Schaltvorrichtung
21	Farbauftragwalze
22	Zwischenwalze

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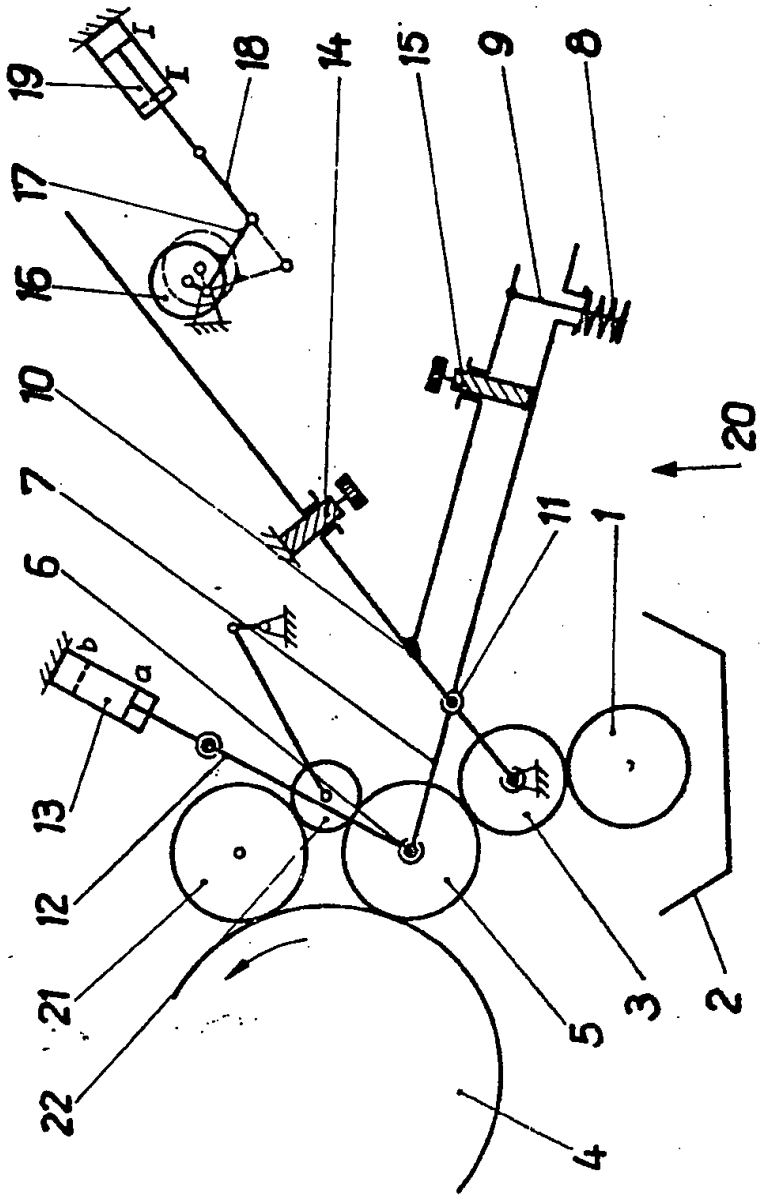

zeichnung